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ENVIRONMENT AGENCY

ENVIRONMENT PROTECTION DEPARTMENT
CORNWALL AREA

FINAL DRAFT

MOUNTS BAY CATCHMENT SURVEY

August 2001

Authors:

Ed Prince

And

Alison Clode

Environment Protection Officers

Geoff Boyd
Area Manager

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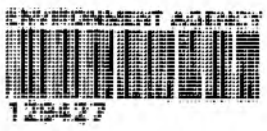


MOUNTS BAY CATCHMENT REPORT

1. INTRODUCTION

1.1 Background:

An Environment Agency investigation into Guideline standard coliform and faecal streptococci failures of the EC Bathing Waters at Mounts Bay including:

Mounts Bay-Little Holgus (No.82114893) (NGR SW 5134 3093)
Mounts Bay-Heliport (No. 82114910) (NGR SW 4865 3107)
Mounts Bay-Penzance (No. 82114960) (NGR SW 4734 2983)

The investigation was carried out in Autumn 2001. The results of this investigation indicated that the main reasons the bathing waters not passing guideline standards was because of sewage effluent discharging from CSO's in close proximity to the beach, domestic septic tank discharges and leaking public toilets adjacent to the beach. To a lesser extent there was also the combined effect of farmyard and track run off, dairy cattle waiting areas and road run off adding to the bacteria levels in the tributaries.

1.2 Catchment

The Mounts Bay Catchment comprises mainly gently sloping river valleys in which the rivers are well buffered from external impacts by dense scrub and Carr woodland. Most of the tributaries originate as springs on the Penwith Moor area, which has been impacted by historical mineral and metal mining. The main rivers within the catchment are the Red River, Ponsandane Brook, which splits into Rosemorran Stream and Trevaylor Stream and the Chyandour Brook. Each main river splits into many spring-fed tributaries. There is also a large marsh area at Marazion that is separated from the beach by the coast road.

1.3 Economy

The Catchment is dominated by reasonably extensive agriculture due to the large moorland areas and rough-grazing characteristics of the area. There are several dairy farms in the area but the dominant livestock are beef cattle and sheep, grazing rough pasture and moorland. The arable fields are seasonally dominated by bulb growing in the south and brassicas further inland. The larger urban sites tend to be concentrated along the coast with Penzance, Heamoor and Trevarrack to the west and Marazion to the east. Further inland, scattered farms and small settlements are the norm with the exception of the villages of Madron, Lower Quarter, Ludgvan, Crowlas and Nancledra. There is also a large industrial estate at Longrock adjacent to the coastline. Tourism plays a major part in the economy of the area and there are several campsites and holiday parks within the catchment.

2. OBJECTIVE:

To investigate all possible natural and anthropogenic sources of bacterial contamination entering the Mounts Bay Catchment main rivers and tributaries. These bacteria may have been contributing factors to the consistent failure to meet the guideline standards at the three Mounts Bay EC Designated Bathing Waters.

3. METHODS:

The methods used to carry out this investigative catchment survey were:

- Desk study of previous written material
- Discussion with relevant EPO and Investigations staff
- Carry out sampling runs to identify bacterial loading within catchment tributaries
- Carry out flow gauging with Hydrometrics staff to assist in calculating loading
- Carry out walk over survey of suspect tributaries, map and photograph any inputs
- Carry out farm visits and campsite visits to investigate pollution potential sources
- Visit South West Water Sewage Treatment Works, pump stations and other private STW to assess pollution risk potential
- WIMS check of existing discharge consents and previous sample results.
- Check SWW internet sewerage mapping site for sewer details

4. RESULTS:

4.1 Stock Watering:

There were relatively few stock watering sites within the catchment as most streams were well buffered by dense scrub and Willow Carr. Some alterations need to be made to dairy cattle waiting areas to keep them away from watercourses but these were the exception rather than the rule. Any stock watering sites found were small and isolated. There were no extensive lengths of unprotected watercourse.

4.2 Farm Pollution Issues:

All farms adjacent to the watercourse were visited. The main problems discovered were due to dirty yard water entering clean water systems, this was often due to the large number of springs in the area making drainage difficult. All premises where previous problems had been reported were re-visited to make sure the problem had been rectified.

Table 1. Farm Pollution Risks
(See Appendix 1 for Photographic Index)

Farm Name /Type	Problem	Action	Recommendation	Photo ref
Carnaquidden Farm SX 4673 3498 Dairy	Stock stand in the stream when waiting to be milked	Move gate back or fence off to keep cattle out of stream.	EPO to undertake a pollution prevention visit.	P121, P131
Boskednan Farm SX 4421 3460 Beef Cattle	Run off from field where JCB working had very high bacti levels of 260 000 total coliforms per 100ml, flowing down road and into Chyandour stream	Run off needs collecting and diverting to dirty water collection system.	EPO to undertake a pollution prevention visit.	P46
Primrose Cottage SX 4404 3426 Beef	Run off from farmyard had very high bacti levels of 42 000 total coliforms per 100ml, and was entering stream	Run off needs collecting and sending to dirty water collection system.	EPO to undertake a pollution prevention visit.	P47
Trye Farm SX 4595 3529 Dairy and beef	Problem with dirty yard water entering a spring in the farm yard, this is then discharged into a field next to the water course	Need to separate dirty water and spring water.	EPO to undertake a pollution prevention visit.	

Table 2. Mounts Bay – Systems Previously Causing Problems

Site	Water Course	Previous Problems	Comments
Hellangrove Farm. NGR SW 4808 3406 Beef Farm	Trib. Of Rosemorran Stream	Slurry pit overflowing	• Stock now kept mainly on straw bedding but the yard design could allow slurry and run off to enter a ditch which could reach the stream during wet weather (see photos P121-127) • EPO to undertake a pollution prevention visit
Trye Farm Mr A Roberts and Sons. NGR SW 4594 3531	Trevaylor Stream	Silage pit overflowing	• Original problem was an old silage pit overflowing – no longer a problem as silage now baled. • 200 dairy cattle. • Slurry collected in large earth banked lagoon, no breakouts apparent. Slurry regularly spread. • No cattle watering sites. • Problem with dirty yard water entering a spring in the farmyard this is then discharged into a field next to the watercourse, need to separate dirty water and spring water, local EPO to undertake a pollution prevention visit.
Carnaquidden Farm Mr M Hampden-Smith. NGR SW 4676 3501	Rosemorran Stream	Silage pit overflowing	• Original problem was a silage pit overflow. Pit silage now cut later so is much drier, no problems since. • No slurry pit, manure regularly spread. • 200 Dairy and beef cattle on 400 acres of ESA. • Cattle waiting area is in the stream could cause problems (see photo P131)
Trevaylor Cottages. NGR SW 4683 3257	Trevaylor Stream	Septic Tank Overflow	• Long way from watercourse • Low risk of pollution
Trecrowan Farm. NGR SW 4618 3199	Chyandour Brook	Farm Drainage Problems (lots of springs on farm)	• U/S of Merry Meeting • Horse livery yard, muckheap has a little run off not really a threat to watercourse. (P111)

4.3 Sewage Related Issues:

Sewage from Penzance and Marazion is no longer treated where it is produced but is pumped to the North Coast and discharged from the St Erth sewage treatment works at Hayle. This has reduced the bacterial loading entering Mounts Bay and probably reduced the likelihood of failing the imperative standards of the Bathing Waters Directive.

Most domestic properties with sewage discharges were an acceptable distance from the tributaries in the Mounts Bay catchment or were well maintained. The three problems below were identified during the catchment investigation.

Table 3. Sewage Related Sites

Location/Type	Problem	Recommendation/ Action	Photo Ref.
Behind No. 12 Pendrea Close. Sewage entering Ponsandane Brook. Shared Septic Tank. NGR SW 4790 3145	Ponsandane Mews is a group of 12 properties further up the hill from Pendrea Close. They share a septic tank that has been overflowing all summer (2001) into a surface water drain, which then enters Ponsandane Brook.	Problem is being investigated by EA, Penwith District Council and SWW. Local EPO to check progress.	P3,4,5
Merry Meeting, Bone Valley, Heamoor. Septic Tank. NGR SW 4611 3166	Effluent from a private septic tank is discharging into a blind ditch. The neighbours have complained that the area has smelled of sewage all summer. The Discharge Consent shows that the discharge pipe should reach Chyandour Brook but it stops short in a scrubby area next to the road.	Local EPO to undertake a pollution prevention visit to ensure compliance with consent conditions.	P1,2
Marazion Public Toilets NGR SW 5182 3058	Sewage effluent is leaking onto the beach directly from public conveniences. Dye tracing proved direct leak to beach in <20 minutes	Local EPO to investigate and contact SWW and Penwith District Council	P10-14,16, 30

Table 4. Mounts Bay – Systems With Consents

NGR	Consent No.	Site	Type	Comments
SW 5140 3137	NRA-SW-0161	Drea Parc, Green Lane West Marazion	Caravan Park Soak away $12m^3$/day	Ok, no signs of breakout
SW 5135 3120	301653	SWW pump station Marazion to Hayle STW	SWW pump station	
SW5164 3315	301605	Crowlas Bridge	Sewage pump station	Right Hand Bank D/S by industrial estate
SW5150 3280	NRA-SW-1156	Crowlas Sewerage Pump Stn.	Sewage pump station	No longer used – pumped to Hayle
SW5170 3310	CRA 188	Crowlas STW, Ludgvan	STW	Industrial estate Crowlas RHB
SW4995 3134	3000271	Gladstone Terrace CSO	CSO	Opposite Mexico Inn, Longrock
SW4979 3116	301814	Mexico Inn	CSO	On beach Opposite level crossing, Longrock
SW4980 3112	300272	Long Rock Ind. Est. Ponjou lane	Pump Station To Hayle STW	On beach Opposite level crossing, Longrock
SW4979 3116	301543	Long Rock Ind. Est.	Pump Station To Hayle STW	On beach Opposite level crossing
SW4972 3585	SWWA 429	Nancledra	STW	Increased D/S Bacti levels picked up in sampling
SW4802 3130	NRA-SW-7145	K&R Builders	Surface water discharge	Behind Tesco
SW4810 3117	NRA-SW-6478	Tesco	Car Park Runoff	With Finns CSO (see photo P94,95)
SW4815 3111	300024	Tesco Garage	Forecourt surface water runoff	Between road bridges D/S Tesco
SW4870 3774	NRA-SW-5170	Sweet Water Trout Farm	Trade discharge	Skillywadden Near Almaveor, elevated bacti levels detected D/S
SW4765 3063	301652	Chyandour PSCSO/EO	PSCSO/EO	Nr Penzance Station
SW4777 3028	302144	Albert Pier	CSO	Penzance Pier
SW4762 3011	300387 FS/01	Dockers Rest Hotel	Discharge	Ross Bridge

NGR	Consent No.	Site	Type	Comments
SW4787 3194	NRA-SW-6702	Hellenoweth Barn	ST/SA (2m3/day)	Ok
SW4792 3151	301820	Trevarrack Lane, Gulval	CSO	U/S road bridge Pendrea Road Ok
SW4790 3145	301819	Rear of 12 Pendra Close	CSO	LHB Residents report no discharges
SW4429 3319	300178	Boswarthen	Private?	Distant from River, low pollution risk

All systems with consents were checked for breakouts.

4.3 Road Runoff:

The Main rivers and their tributaries are crossed by minor roads in 29 places, by 'B' roads in 3 places and by major 'A' roads in 8 places. Problems with runoff from farmyards entering road drains were found in a few places including Primrose Cottage and Boskednan Farm. Non bacterial inputs were located at many sites particularly in the urban areas where oils, silts and other contaminants can readily enter the watercourse (see photo P92).

4.4 Ecology:

Otter (*Lutra lutra*) spraint was recorded in Ponsandane Brook and a dipper was also seen. The catchment is very important for wetland bird species due to the presence of Marazion Marsh, which is managed by the RSPB and also encourages tourists to the area. Trout were seen on all the tributaries with year round flow, however they were not numerous.

There is a large amount of the invasive plant Japanese KnotWeed growing adjacent to the watercourses and the roads throughout the entire catchment (Fig 5.)

4.5 Photographic Record:

Photographs were taken throughout the catchment during the survey including discharge pipes, cattle watering sites, farmyards, etc and are listed in Appendix 1, numbered P1 to P133. (Photos stored in Bodmin Registry file 21A Mounts Bay Catchment Survey)

5. DISCUSSION:

The main problems in the Mounts Bay Catchment are:

- Farm yard and track run off
- Dairy cattle waiting/watering areas
- Road Run off
- Septic tank discharges
- CSOs close to the Bathing Beach
- Leaking public toilets

5.1 Farm yard and track run off

There were several sites where farmyard waste and dirty water was entering surface water drains and streams, (Table 1) there were also a large number of natural springs in the area which made drainage a problem on some farms. The problems were mainly due to the lack of separate clean and dirty water collection systems unnecessarily increasing the amount of dirty wastewater for disposal. Although these problems would be more acute in the winter months, they also posed a significant problem during wet periods of the bathing season between May and September.

5.2 Dairy Cattle Waiting Areas

Farmyard design was a problem on some farms where dairy cattle were standing waiting in the stream before being milked. Adjustments to the positioning of field gates or fencing off streams would prevent this problem.

Stock watering was not a significant problem in the Mounts Bay Catchment. There are not many stock access points near the bathing water due to the concentration of urban development in this area. All stock watering sites noticed during the survey can be found in figure 4. The main reason there were few stock watering sites in the more remote areas of the catchment was due to scrub and Willow Carr woodland acting as a buffer zone along the river banks, or adequate fencing.

5.3 Road Run Off

The Rivers and tributaries in the Mounts Bay Catchment are crossed 40 times by roads. In several places field and farm yard run off enters the watercourse via road drains, therefore work needs to be done in the area to promote best farming practices to prevent excessive run off and to collect the dirty water before it enters streams.

In agricultural areas high levels of bacteria can enter watercourses and may lead to EC BW sample failures. Other contaminants and sediments also gain entry to watercourses via road run off.

5.4 Septic Tank Discharges

There were two domestic properties with septic tanks that were discharging to streams in the area with sewage debris seen in the watercourse. These properties were causing

a significant risk to the water quality and will be re-visited to ensure alterations have been made to the appropriate standards.

5.5 Marazion Public Toilets

The public toilets at The Square, Marazion (NGR SW 51829 30581) leak directly onto the beach near the jetty for St Michael's Mount.

It was noticed that a liquid was discharging from the base of a sea wall at SW 51822 30564 and this liquid smelled of sewage and disinfectant. On investigation it was noticed that directly above the point of discharge and about ten metres inland, was a public convenience operated by Penwith District Council at The Square.

On Tuesday 30th October 2001 at 13.00 hrs green dye was added to the toilets and urinals and flushed. By 13.20hrs green dye was visible flowing from the base of the sea wall and then down to the sea (see photos). This would indicate a significant leak in the pipework emanating from the toilets or that the storage facility at the toilets had failed.

These toilets are particularly busy during the bathing water season and this discharge could be contributing to the failure of Little Holgus beach in achieving the guideline standard as set by the Bathing Water Directive.

Action required is to contact Penwith District Council to ascertain where the effluent from these toilets is supposed to go. Should they be connected to mains or stored in a cesspool for emptying. There are main sewers down gradient and between the public convenience and the beach, should they be connected in? The main sewer was also checked for leaks using green dye, no dye washed out onto the beach. This would indicate that it was the toilets sewerage pipe system or the storage facility that was leaking. Action should be taken by the responsible parties to remedy this situation prior to the commencement of the 2002 bathing season in May.

5.6 Combined Sewer Overflows

There are a number of CSOs in close proximity to the Mounts Bay beaches, sewage debris was seem in the tributaries and on the beaches. The operation of these CSOs, paticularly Finns CSO, in the summer will add to the risk of EC Bathing Water failure.

The monitoring of operation times by these CSO's would be useful in determining their relation to bathing water quality during the sampling period.

6. CONCLUSIONS:

The findings of this survey indicate that the main sources of diffuse pollution affecting the bacterial water quality in the Mounts Bay catchment are:

- Farm yard and track run off
- Septic tank discharges
- Dairy cattle waiting/watering areas
- Road run off
- Public toilets sewerage failure
- CSO operation

In the past there have also been point sources such as silage pits and slurry stores overflowing, all these sites were re-visited and no longer appeared to be a threat to water quality.

The main farm-related source of pollution was run off from farm yards and tracks which entered surface water drains, work needs doing in the catchment to separate clean and dirty water collection systems and promote best farming practices.

There were problems in the catchment with several domestic septic tank discharges that were causing sewage-related debris to accumulate in some tributaries.

The public toilets at Marazion are leaking sewage effluent onto the beach, this needs investigating further by the toilet operators to discover if the problem is in the pipework emanating from the toilets or if the storage facility at the toilets has failed.

There are a large number of CSOs in close proximity to the beaches, which if allowed to discharge during the bathing water season, would increase the risk of failure of the EC Bathing Water standards. The operation of these CSO's should be monitored during the bathing season to assess their effect on water quality samples taken.

7. RECOMMENDATIONS:

7.1 Follow up Farm Pollution Prevention Visits to encourage best farming practice and ensure necessary improvements are carried out. Where appropriate this to be undertaken in consultation with EnSus/ADAS consultants using Farm Waste Management Plans and Pollution Control guidance.

Action: Environment Protection Team Leader (West)

7.2 Identify sources of funding which may be available for farm improvements e.g. Countryside Stewardship.

Action: Regional External Funding Officer/Cornwall Project Officer

7.3 Ensure all septic tank improvements are carried out to appropriate standards.

Action: Environment Protection Team Leader (West)

7.4 Write to all farmers, landowners and interested parties contacted during the survey to summarise the findings and encourage future co-operation in improving water quality.

Action: Catchment Survey Environment Protection Officers

7.5 Undertake 'Time of Travel' studies on the Mounts Bay Streams to determine the timescale for impact of pollutants at Mounts Bay Bathing Waters.

Action: Investigations Team Leader

7.6 Investigate if any work has been done to assess the impact of sewage from trains entering watercourses as diffuse pollution. The railway runs adjacent to the beach at Mounts Bay for 3.25 km and alongside the Red River for 1.5 km. The railway also crosses the Red River 3 times and cuts through the centre of Marazion Marsh. Crude sewage from trains is discharged from moving trains on to the ballast material. During rainfall events this sewage is washed into nearby watercourses via drains or into the groundwater.

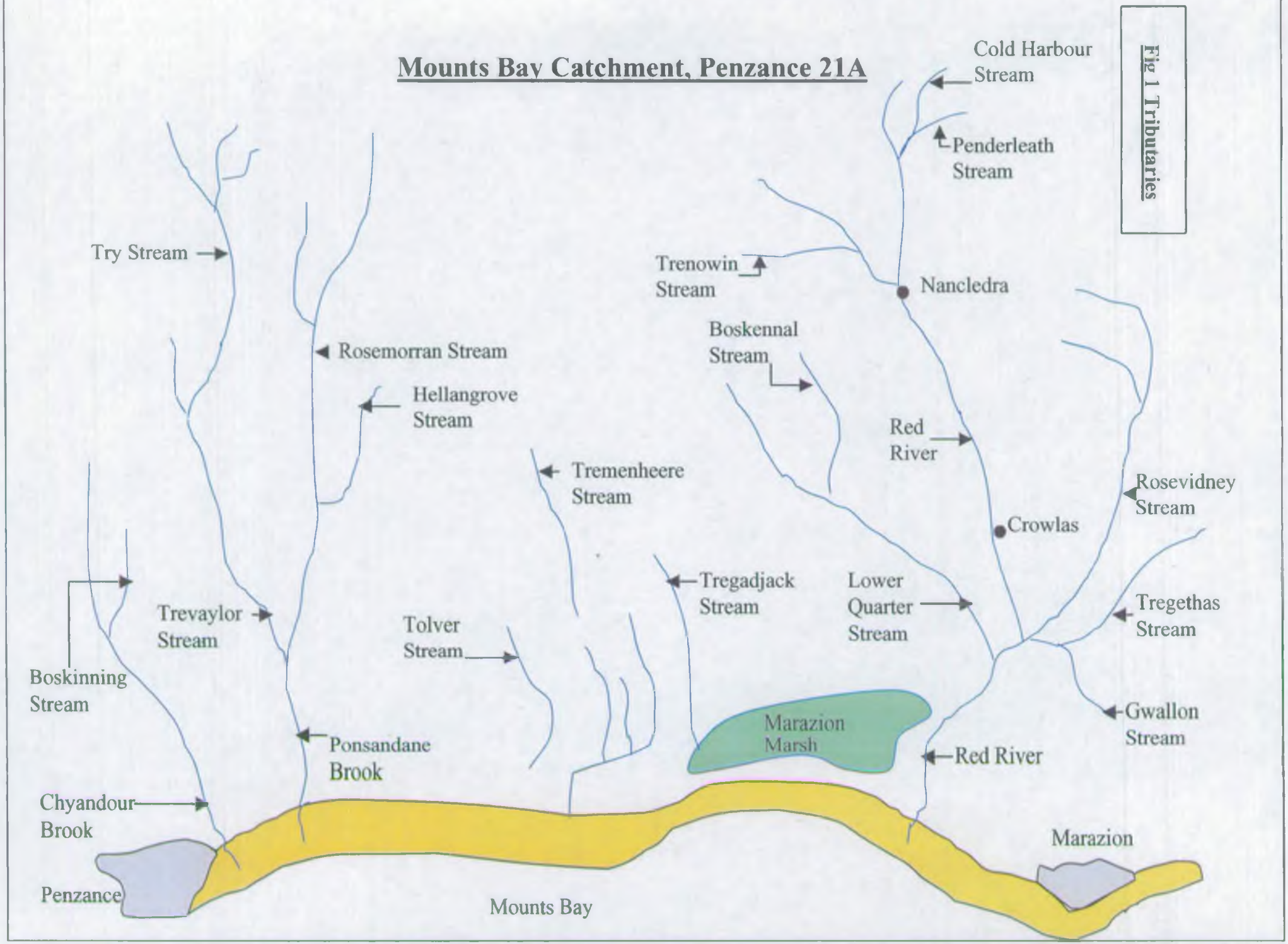
Action: Possible R&D potential or Investigations team

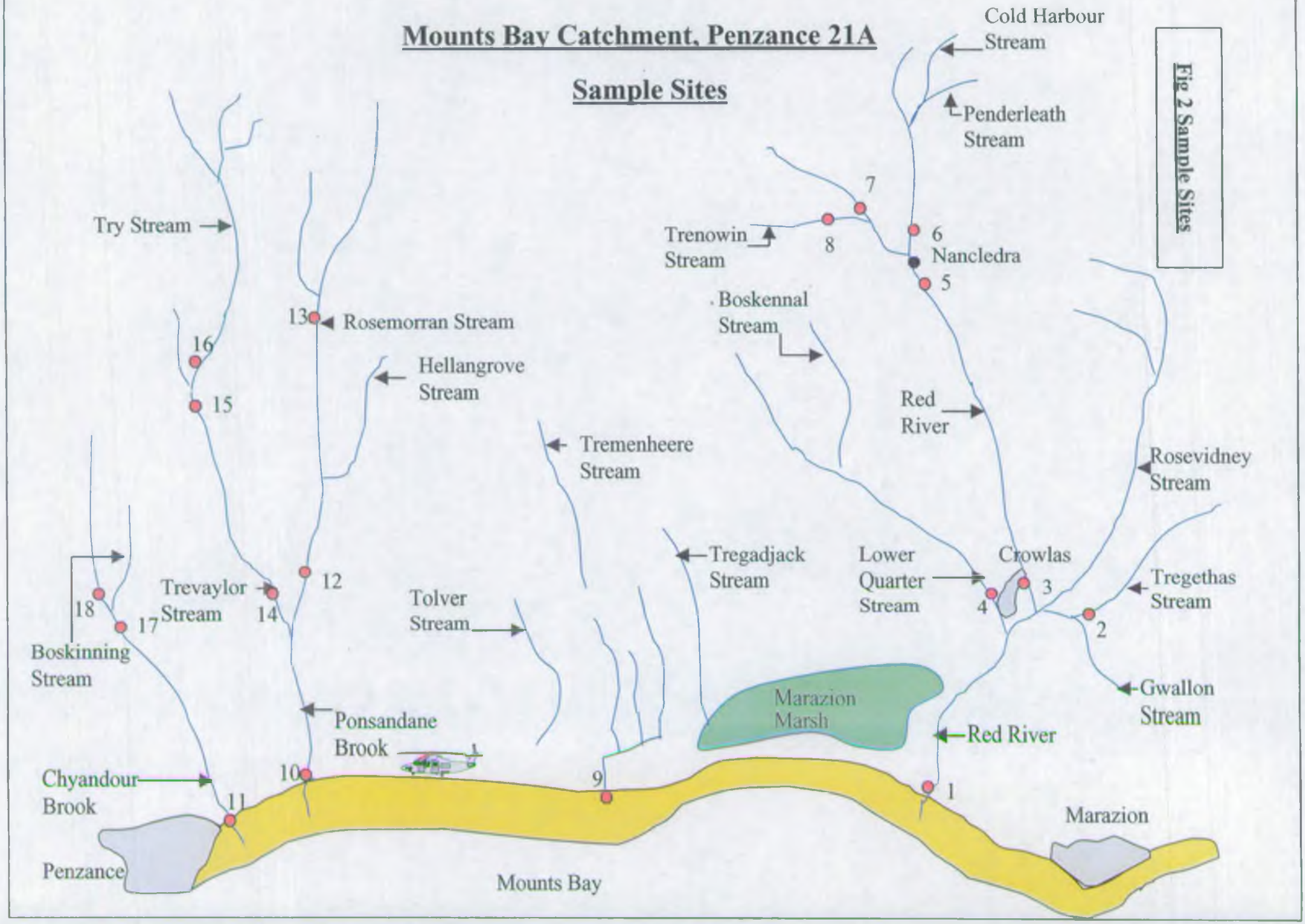
7.7 Investigate if any work has been done to assess the impact of increased levels of wetland bird faeces entering the marsh and its effect on the Red River that leaves the marsh and discharges into Mounts Bay.

Action: Possible R&D potential or Investigations team

7.8 Inform Penwith District Council who are responsible for the toilets at Marazion and make sure remedial works to prevent sewage entering the beach are carried out before the beginning of the bathing season 2002.

Action: Environment Protection Team Leader (West)


Mounts Bay Catchment, Penzance 21A
Fig 1 Tributaries
Cold Harbour Stream
Penderleath Stream
Try Stream
Trenowin Stream
Nancledra
Boskennal Stream
Rosemorran Stream
Hellangrove Stream
Red River
Tremenheere Stream
Rosevidney Stream
Crowlas
Tregadjack Stream
Lower Quarter Stream
Tregethas Stream
Trevaylor Stream
Tolver Stream
Boskinning Stream
Gwallon Stream
Marazion Marsh
Ponsandane Brook
Red River
Chyandour Brook
Marazion
Penzance
Mounts Bay


Mounts Bay Catchment, Penzance 21A
Sample Sites
Fig 2 Sample Sites
Cold Harbour Stream
Penderleath Stream
Try Stream
Trenowin Stream
Nancledra
Boskennal Stream
Rosemorran Stream
Hellangrove Stream
Red River
Tremenheere Stream
Rosevidney Stream
Tregadjack Stream
Lower Quarter Stream
Crowlas
Tregethas Stream
Trevaylor Stream
Tolver Stream
Boskinning Stream
Gwallon Stream
Marazion Marsh
Ponsandane Brook
Red River
Chyandour Brook
Marazion
Penzance
Mounts Bay
1
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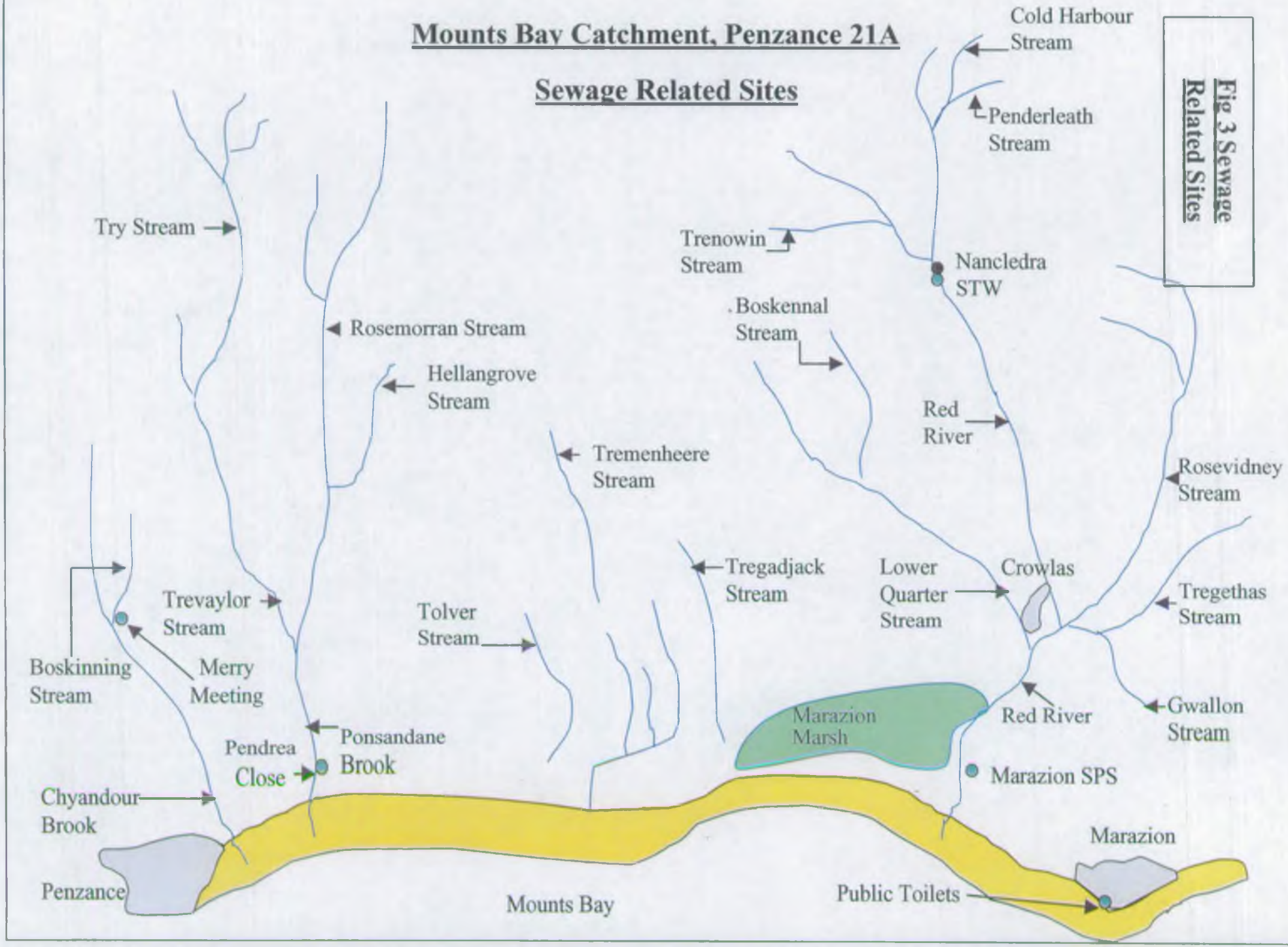
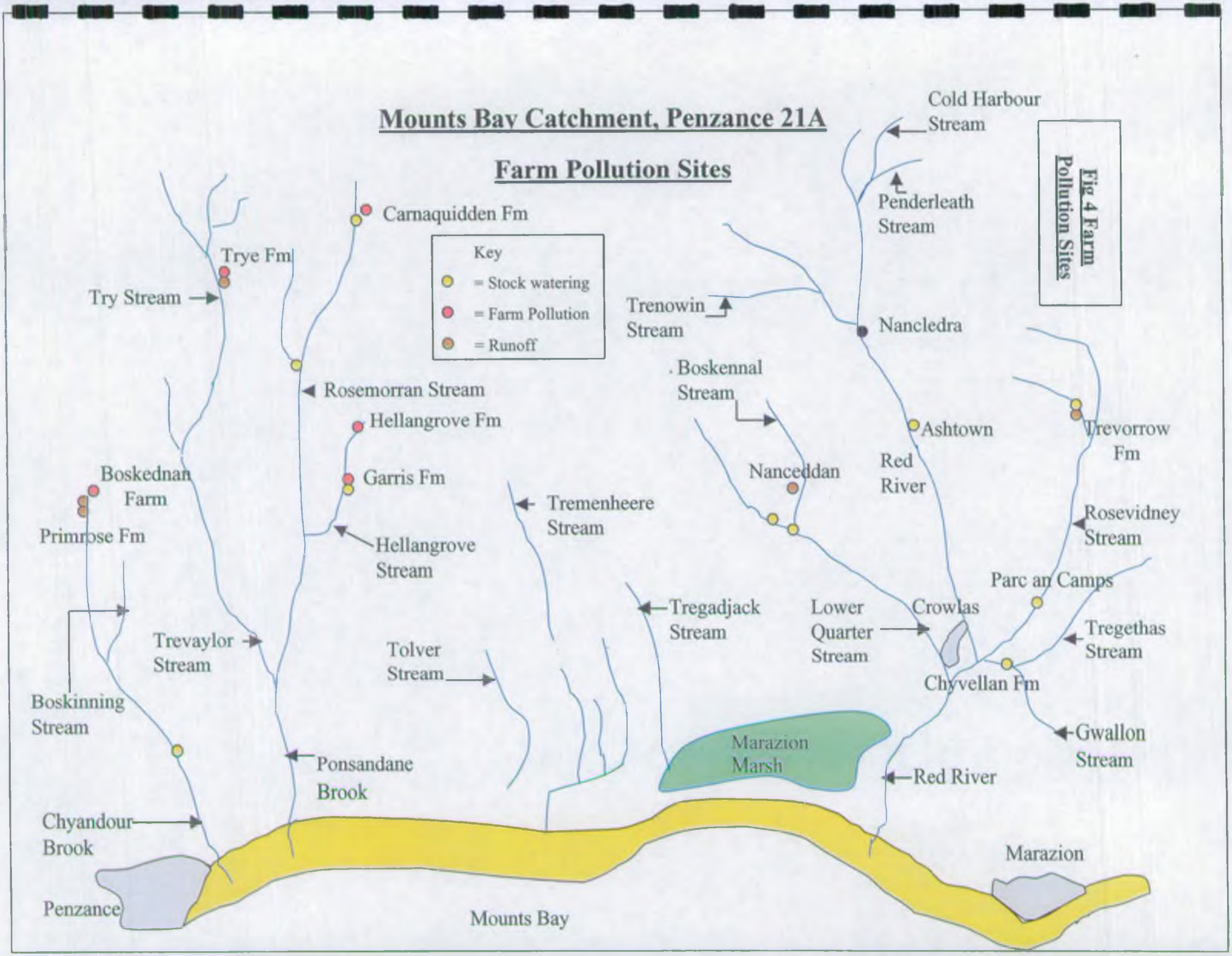

Mounts Bay Catchment, Penzance 21A
Sewage Related Sites
Fig 3 Sewage Related Sites
Cold Harbour Stream
Penderleath Stream
Try Stream
Trenowin Stream
Nancledra STW
Boskennal Stream
Rosemorran Stream
Hellangrove Stream
Red River
Tremenheere Stream
Rosevidney Stream
Tregadjack Stream
Lower Quarter Stream
Crowlas
Tregethas Stream
Trevaylor Stream
Tolver Stream
Boskinning Stream
Merry Meeting
Marazion Marsh
Red River
Gwallon Stream
Pendrea Close
Ponsandane Brook
Marazion SPS
Chyandour Brook
Marazion
Penzance
Public Toilets
Mounts Bay


Mounts Bay Catchment, Penzance 21A
Farm Pollution Sites
Fig 4 Farm Pollution Sites
Key
= Stock watering
= Farm Pollution
= Runoff
Cold Harbour Stream
Penderleath Stream
Carnaquidden Fm
Trye Fm
Try Stream
Trenowin Stream
Nancledra
Rosemorran Stream
Boskennal Stream
Hellangrove Fm
Ashtown
Trevorrow Fm
Boskednan Farm
Garris Fm
Nanceddan
Red River
Primrose Fm
Tremenheere Stream
Rosevidney Stream
Hellangrove Stream
Parc an Camps
Tregadjack Stream
Lower Quarter Stream
Crowlas
Tregethas Stream
Trevaylor Stream
Tolver Stream
Chyvellan Fm
Boskinning Stream
Gwallon Stream
Marazion Marsh
Ponsandane Brook
Red River
Chyandour Brook
Marazion
Penzance
Mounts Bay

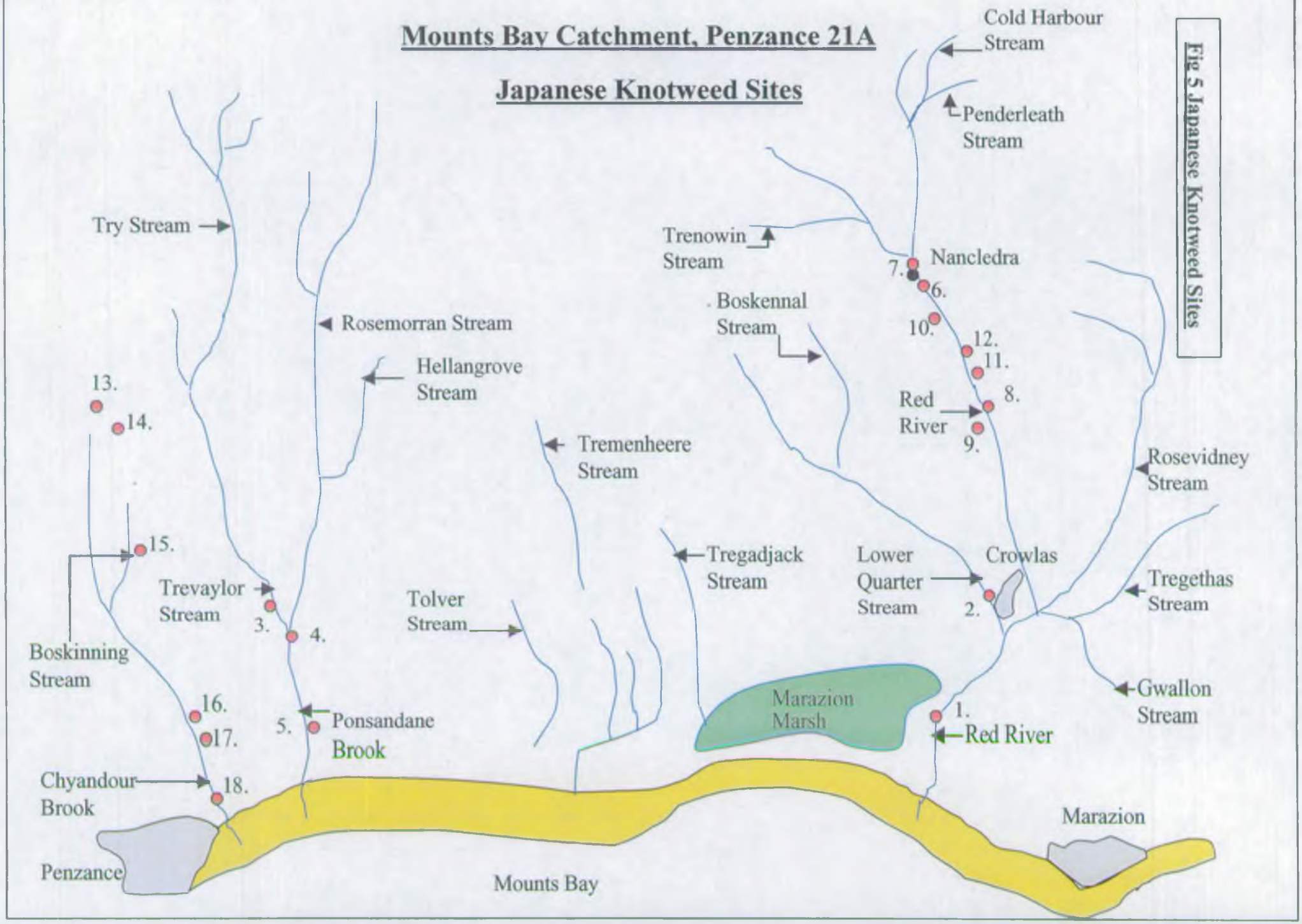

Mounts Bay Catchment, Penzance 21A
Japanese Knotweed Sites
Fig 5 Japanese Knotweed Sites
Cold Harbour Stream
Penderleath Stream
Try Stream
Trenowin Stream
Nancledra
7.
6.
Boskennal Stream
10.
12.
11.
8.
Red River
9.
Rosemorran Stream
Hellangrove Stream
13.
14.
Tremenheere Stream
Rosevidney Stream
15.
Tregadjack Stream
Lower Quarter Stream
Crowlas
2.
Tregethas Stream
Trevaylor Stream
3.
4.
Tolver Stream
Boskinning Stream
16.
17.
5.
Ponsandane Brook
Marazion Marsh
1.
Red River
Gwallon Stream
Chyandour Brook
18.
Marazion
Penzance
Mounts Bay

Fig 6 Knotweed Site Details

Japanese Knotweed Sites

1. @ NGR SW 5136 3116 Marazion Marsh
2. @ NGR SW 5109 3322 Lower Quarter Crowlas
3. @ NGR SW 4769 3179 Bleu BridgeGulval
4. @ NGR SW 4783 3173 Ridgevale Lane Gulval
5. @ NGR SW 4805 3135 Branwell Lane Gulval
6. @ NGR SW 4964 3586 Nancledra STW
7. @ NGR SW 4941 3615 Alamebra Rd Nancledra
8. @ NGR SW 5042 3478 Cucurrian Mill
9. @ NGR SW 5058 3458 Cucurrian Valley Cottage
10. @ NGR SW 4981 3567 Nancledra Boundary Stone
11. @ NGR SW 5018 3515 Ashtown Farm
12. @ NGR SW 5011 3531 South of Bostampys
13. @ NGR SW 4459 3488 Tredinneck, Nr Boskednan
14. @ NGR SW 4473 3460 North of Mission House
15. @ NGR SW 4613 3233 Tremearne, Boskinning Stream
16. @ NGR SW 4693 3153 A30 Roundabout Nr Higher Trannack
17. @ NGR SW 4724 3144 A30 Between Higher and Lower Trannack
18. @ NGR SW 4776 3111 Chyandour Lane

Appendix 1.0

Photographic Index

No.	Watercourse	Description
1	Chyandour Brook	Septic tank discharge to blind ditch, Merry Meeting, Heamoor
2	Chyandour Brook	Septic tank discharge to blind ditch, Merry Meeting, Heamoor
3	Ponsandane Brook	Behind 12 Pendrea Close, discharge from Ponsandane Mews septic tank entering stream
4	Ponsandane Brook	Behind 12 Pendrea Close, discharge from Ponsandane Mews septic tank entering stream
5	Ponsandane Brook	Behind 12 Pendrea Close, discharge from Ponsandane Mews septic tank entering stream
6	Mounts Bay	Beach defences being built
7	Mounts Bay	Central outfall being cleaned
8	Mounts Bay	DP SW @ Marazion beach
9	Mounts Bay	DP's in sea wall @ Marazion beach
10	Mounts Bay	Dye from toilets @ Marazion on beach
11	Mounts Bay	Dye leaking between stones in seawall @ Marazion
12	Mounts Bay	Dye leaking from toilets through seawall @ Marazion
13	Mounts Bay	Dye on beach @ Marazion from public toilets
14	Mounts Bay	Dye pooling beneath seawall leak @ Marazion
15	Mounts Bay	East outfall Mounts Bay
16	Mounts Bay	Green dye leaking from wall beneath Marazion public toilets
17	Mounts Bay	Marazion looking East
18	Mounts Bay	Mounts Bay beach looking west
19	Mounts Bay	Mounts Bay looking east to Marazion
20	Mounts Bay	New manhole on Mounts Bay beach
21	Mounts Bay	Old DP on Marazion seawall
22	Mounts Bay	Pub courtyard washings onto beach @ Marazion
23	Mounts Bay	Pub courtyard washings onto beach @ Marazion
24	Mounts Bay	Pub washings on beach @ Marazion
25	Mounts Bay	Pub yard washings on beach, Godolphin Arms, Marazion
26	Mounts Bay	Public toilet effluent on beach @ Marazion
27	Mounts Bay	St Michaels Mount
28	Mounts Bay	Stream discharge through rock armour
29	Mounts Bay	Stream flowing through rock armour
30	Mounts Bay	Toilet discharge @ foot of wall, Marazion
31	Mounts Bay	West outfall Mounts Bay
32	Chyandour Brook	Abs pipe in stream at mill on Chyandour
33	Chyandour Brook	Chyandour stream alongside A30 @ Heamoor
34	Chyandour Brook	Chyandour stream alongside A30 @ Heamoor
35	Chyandour Brook	Chyandour stream

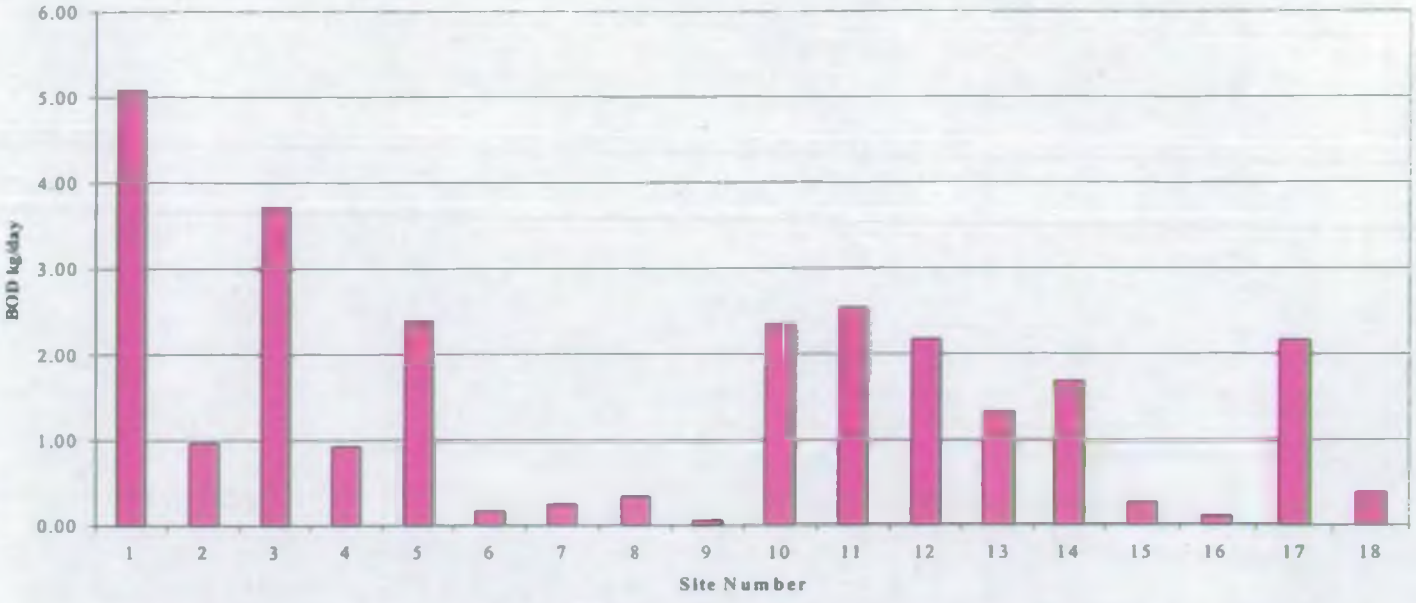
No.	Watercourse	Description
36	Chyandour Brook	Culvert issue under A30 Chyandour stm
37	Chyandour Brook	Culvert under railway for chyandour stm
38	Chyandour Brook	Discharge pipe road drainage A30
39	Chyandour Brook	Discharge to ditch at Merry Meeting Heamoor
40	Chyandour Brook	DP LHB Chyandour Stream garage sink drain
41	Chyandour Brook	Farmyard generating run off from beef cattle(Primrose fm)
42	Chyandour Brook	Hunt kennel drains at Madron
43	Chyandour Brook	Hunt kennels beside Chyandour Stream
44	Chyandour Brook	Hunt Kennels Madron
45	Chyandour Brook	Opening to culvert under A30 Chyandour Stream
46	Chyandour Brook	Primrose cottage road run off
47	Chyandour Brook	Primrose Cottage track run off
48	Chyandour Brook	PSTW discharge to ditch @ Merry Meeting
49	Chyandour Brook	Stream adjacent to hunt kennels subject to runoff
50	Longrock Streams	Culvert issue at heliport Penzance
51	Longrock Streams	Culvert issue at heliport Penzance
52	Longrock Streams	Culvert opening at heliport Penzance
53	Longrock Streams	Main sewer line to Longrock at Chyandour Stream
54	Longrock Streams	Sewage fungus on wall at Safeway Penzance(to s/w drain)
55	Longrock Streams	Stream discharging to beach near toilets
56	Longrock Streams	Tremenheere grate at Longrock
57	Longrock Streams	Tremenheere issues beneath A30
58	Longrock Streams	Tremenheere sinks below A30
59	Longrock Streams	Tremenheere stream at Longrock
60	Longrock Streams	Tremenheere stream at Longrock rd
61	Marazion River	Abs pipe from Tregethas Stm
62	Marazion River	Aeraters at Sweetwater Trout Farm
63	Marazion River	Communal septic tank at Treassowe
64	Marazion River	Crop run off in field at Nanceddan
65	Marazion River	SW @ Treassowe Manor
66	Marazion River	SW site Boskennal Stm
67	Marazion River	DP @ Bostampys 2
68	Marazion River	DP @ Bostampys
69	Marazion River	DP LHB Crowlas DS A30
70	Marazion River	Ford @ SW site Ashtown Farm
71	Marazion River	Heron trapped in fish tank at Sweetwater Trout Farm
72	Marazion River	Heron trapped in tank at Sweetwater Trout Farm
73	Marazion River	Lake @ Sweetwater Trout Farm
74	Marazion River	Lake overflow from Sweetwater Trout Farm
75	Marazion River	Lakes @ Sweetwater Trout Farm
76	Marazion River	Looking South from A394 to marshes
77	Marazion River	Moleskin Algae Crowlas US A30
78	Marazion River	Nancledra STW
79	Marazion River	Rearing lake @ Sweetwater Trout Farm
80	Marazion River	Rearing tank @ Sweetwater Trout Farm

No.	Watercourse	Description
81	Marazion River	Red River entering Beach
82	Marazion River	Stock watering @ Truthwell Mill
83	Marazion River	SWW SPS @ Marazion
84	Marazion River	Twin dishcarge pipes from Sweetwater Trout Farm to Stm
85	Marazion River	Vertical discharge pipe from lake @ Sweetwater Trout Farm
86	Trevaylor Streams	Confluence of Rosemorran and Trevaylor Streams
87	Trevaylor Streams	CSO US Pendrea Road LHB
88	Trevaylor Streams	SW site @ Boscreegee Farm Rosemorran Stm
89	Trevaylor Streams	DP LHB Trevaylor Stm US Tesco
90	Trevaylor Streams	DP LHB Trevaylor Stm US Tescos
91	Trevaylor Streams	DP LHB Trevaylor Stm US Leat offtake
92	Trevaylor Streams	DP US A30 Tesco Penzance RHB
93	Trevaylor Streams	Field run off on road to Trevaylor Stm
94	Trevaylor Streams	Finns CSO @ Tesco Penzance LHB
95	Trevaylor Streams	Finns CSO outfall on Trevaylor Stm (opp Tesco)
96	Trevaylor Streams	First confluence Trevaylor Stm and Leat
97	Trevaylor Streams	Gross sewage debris DS Bolitho CSO
98	Trevaylor Streams	Gross sewage debris DS Finns CSO Trevaylor Stm
99	Trevaylor Streams	Leat offtake nr Pendrea Rd
100	Trevaylor Streams	Old Mill workings on Leat @ Ponsandane
101	Trevaylor Streams	Otter spraint in Trevaylor Stm Penzance 10-10-01
102	Trevaylor Streams	Spring and SW @ Gairns Farm Rosemorran Stm
103	Trevaylor Streams	SPS outfall @ Tesco Ponsandane
104	Trevaylor Streams	Stm on Mounts Bay Beach
105	Trevaylor Streams	ST DP @ rear of 12 Pendrea Close
106	Trevaylor Streams	Track run off en route to Trevaylor Stm
107	Trevaylor Streams	Trevaylor Stm headwaters
108	Trevaylor Streams	Trevaylor Stm Ponsandane rd tunnel
109	Trevaylor Streams	Disused STW grating nr sheltered housing
110	Trevaylor Streams	Work in fields causing run off @ Trevaylor Stm
111	Trevaylor Streams	Trescrowan livery yard muck heap
112	Tregethas Stream	Lake 1 at Tregilliowe Farm
113	Tregethas Stream	Lake 2 at Tregilliowe Farm
114	Rosevidney Stm	Protective grates in stream at Cockwells
115	Tregethas Stream	Pump House at Tregilliowe Farm Lakes
116	Rosevidney Stm	Stock watering site at Trevorrow Farm
117	Rosevidney Stm	Stock watering US track at Trevorrow Farm
118	Tregethas Stream	Stream alongside Tregilliowe Lakes
119	Rosevidney Stm	Track runoff & stock watering at Trevorrow Farm
120	Tregethas Stream	Tregilliowe Lakes from the farm
121	Rosemorran Stm	Hellangrove Fm Yd 1
122	Rosemorran Stm	Hellangrove Fm Yd 5
123	Rosemorran Stm	Hellangrove Fm Yd 6
124	Rosemorran Stm	Hellangrove Fm Yd 3
125	Rosemorran Stm	Hellangrove Fm Yd 4

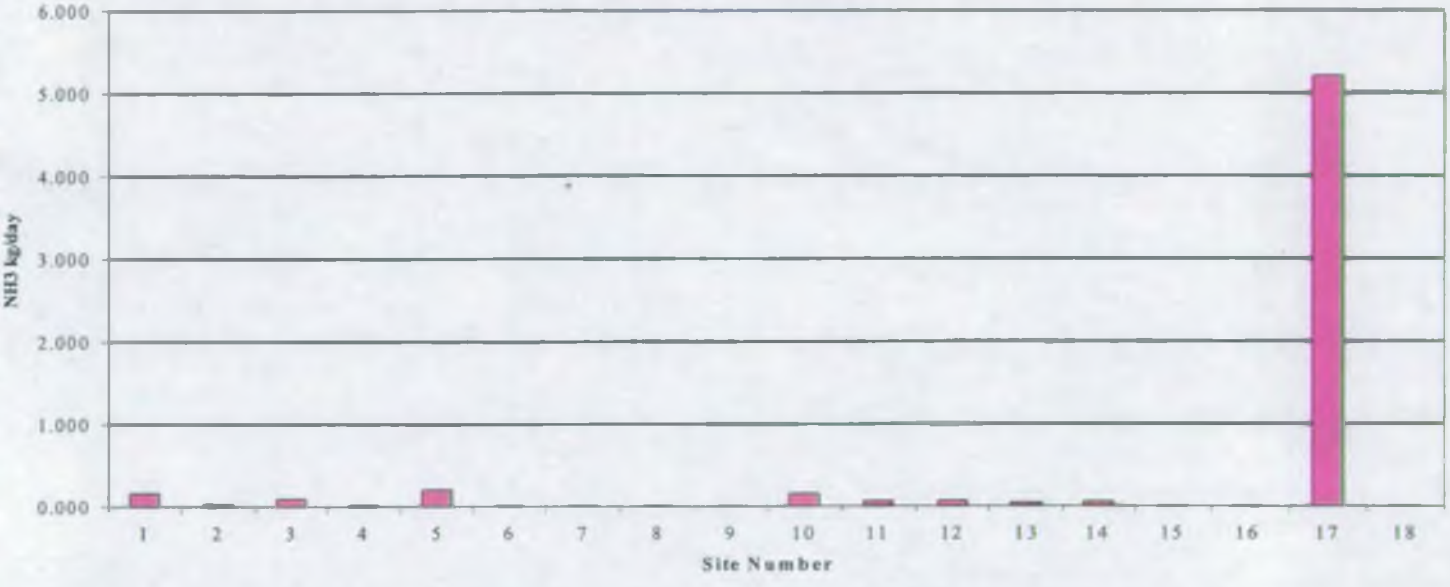
No.	Watercourse	Description
126	Rosemorran Stm	Hellangrove Fuel Tank
127	Rosemorran Stm	Hellangrove Fm Yd2
130	Mounts Bay	Dye tracing leak to sewerage system
131	Rosemorran Stm	Cattle waiting area, Carnaquidden Fm
132	Mounts Bay	Mounts Bay
133	Mounts Bay	Mounts Bay

Appendix II

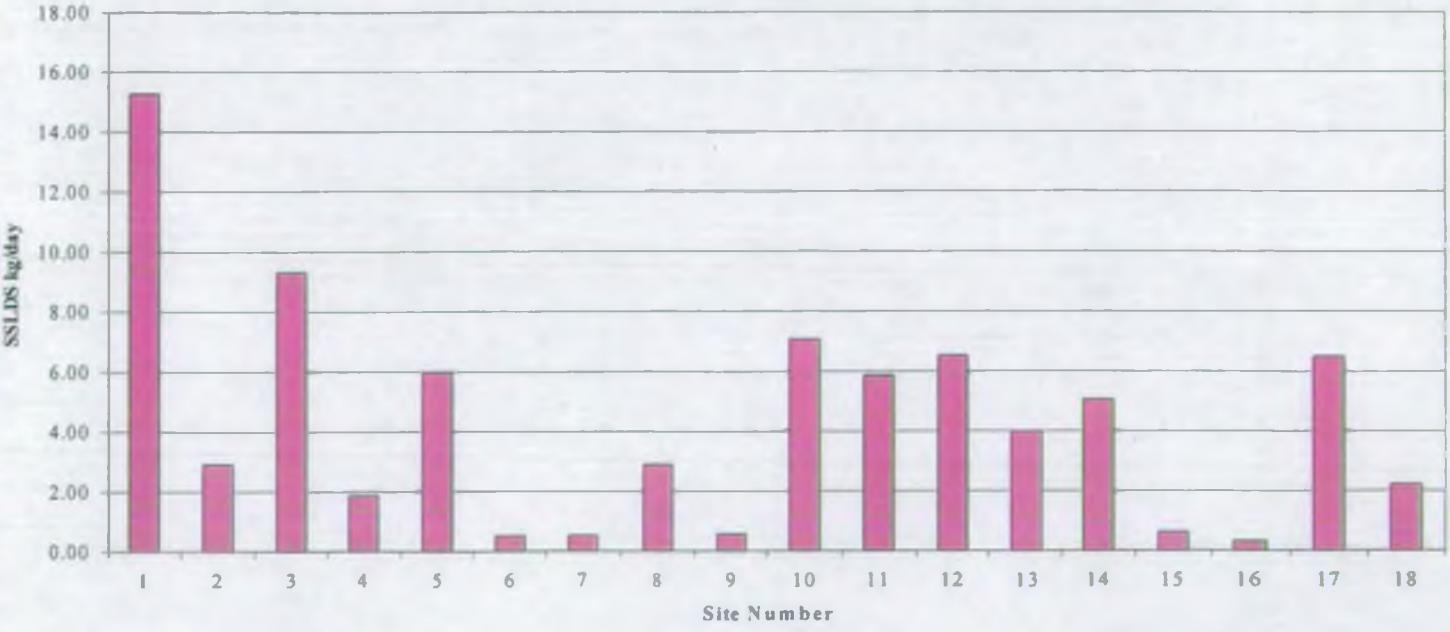
BOD Loading in Mounts Bay Streams in Dry Weather



Ammonia Load in Mounts Bay Streams During Dry Weather

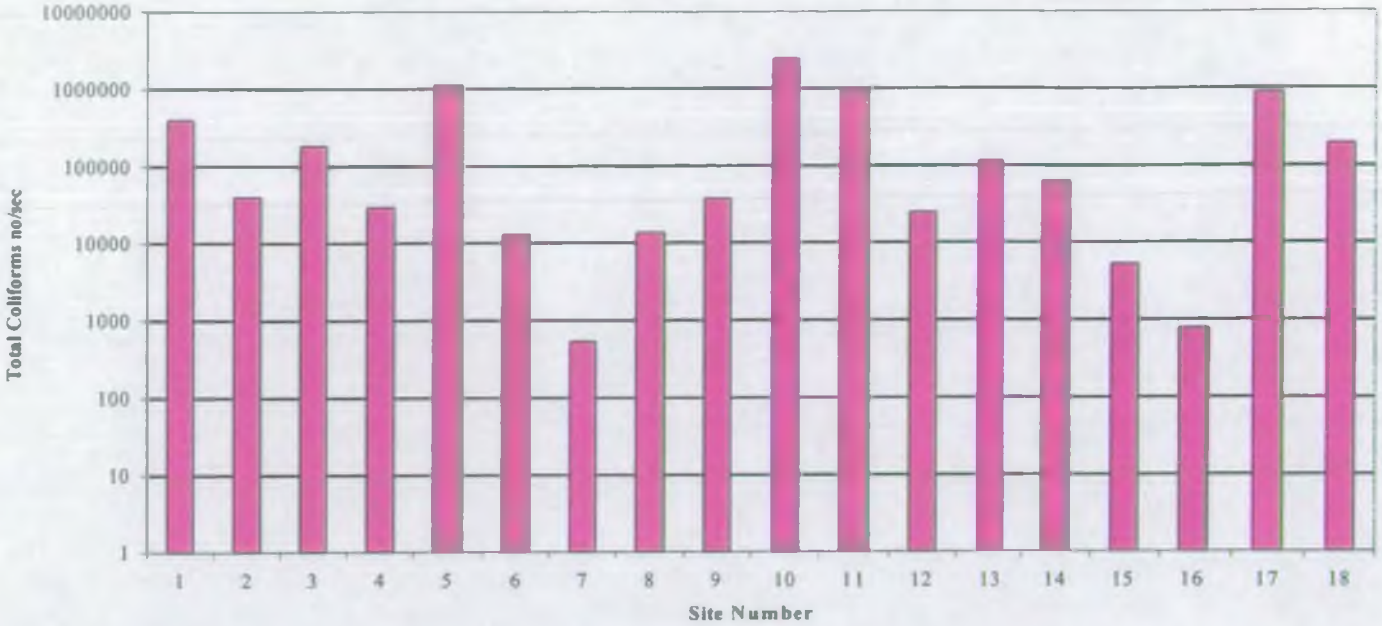


Suspended Solids Load in Mounts Bay Streams in Dry Weather



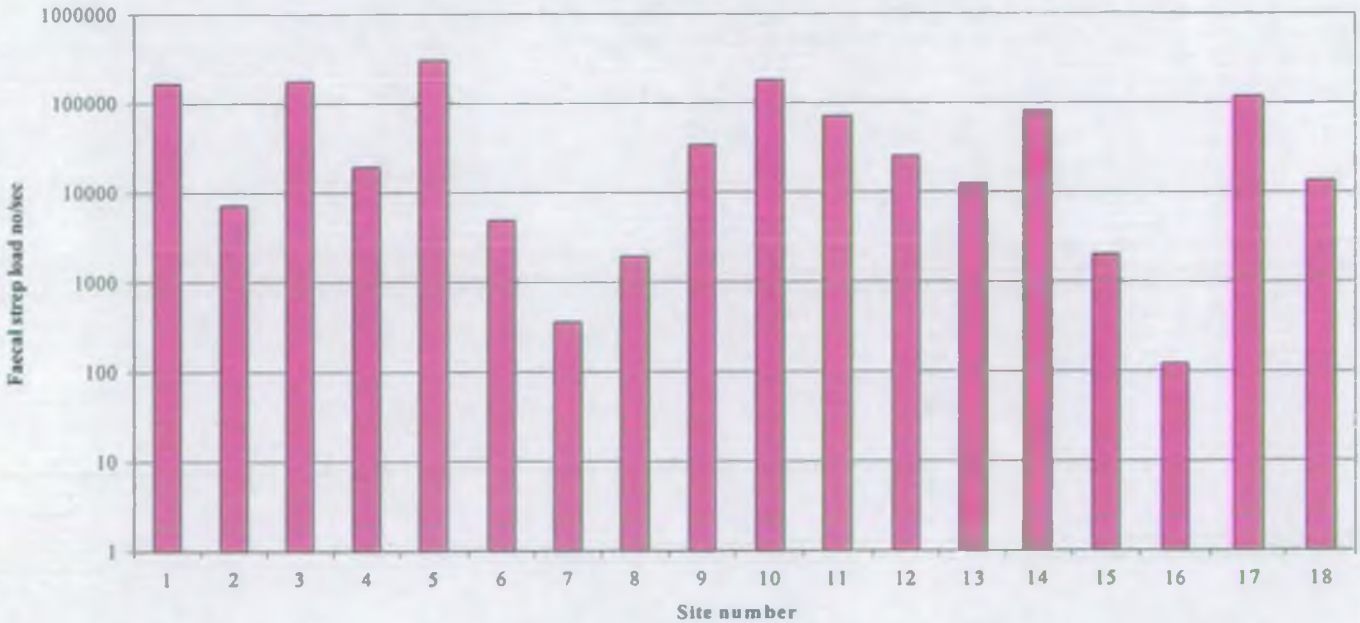
Appendix II

Total Coliform Load in Mounts Bay Streams



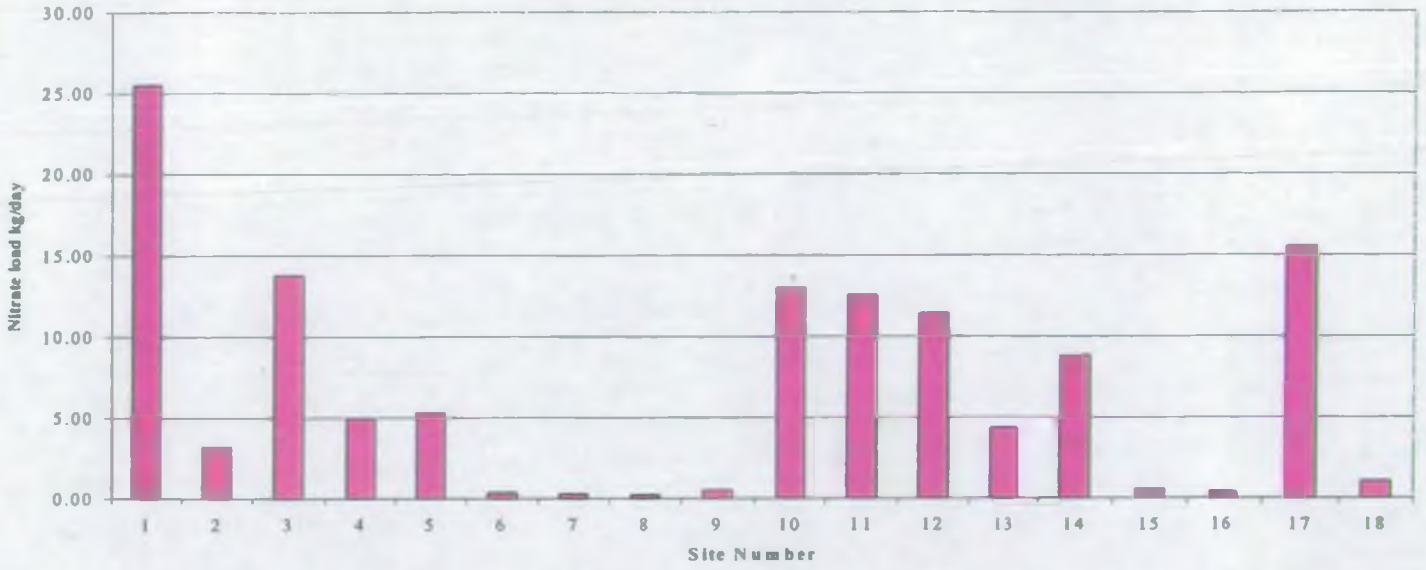
Faecal Coliform Load in Mounts Bay Streams

Faecal Streptococci Load on Mounts Bay Streams

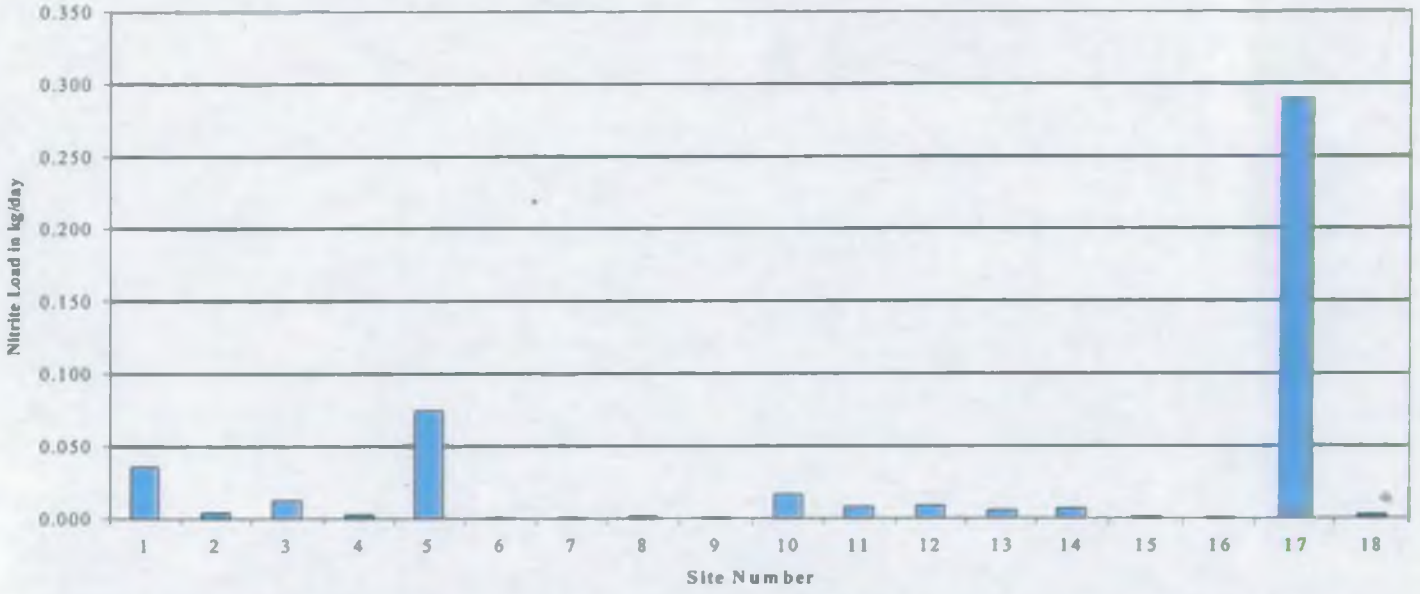


Appendix II

Nitrate Load at all sites in Mounts Bay Dry Weather Survey



Nitrite Loads in Mounts Bay Streams in Dry Weather



Orthophosphate Load in Mounts Bay Streams During Dry Weather